

Abstract of the Disclosure

A semiconductor manufacturing process wherein a low-k dielectric layer is plasma etched with selectivity to an overlying mask layer. The etchant gas can be oxygen-free and include a fluorocarbon reactant, a nitrogen reactant and an optional carrier gas, the fluorocarbon reactant and nitrogen reactant being supplied to a chamber of a plasma etch reactor at flow rates such that the fluorocarbon reactant flow rate is less than the nitrogen reactant flow rate. The etch rate of the low-k dielectric layer can be at least 5 times higher than that of a silicon dioxide, silicon nitride, silicon oxynitride or silicon carbide mask layer. The process is useful for etching 0.25 micron and smaller contact or via openings in forming structures such as damascene structures.